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EXTENSIVE AUTOMATION OF BROADCASTING AND COMMUNICATIONS EQUIPMENT

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Unsigned Editorial

The resolutions of the July Plenum of the TsK KPSS [Central Committee of the Communist Party of the Soviet Union] provide for further extensive introduction of automatization and mechanization in all branches of the national economy. Special attention is devoted therein to complex automatization and complex mechanization, embracing all links of production processes and of auxiliary and secondary operations. At the present time such complex automatization and mechanization constitute one of the principal means of technical progress.

Automatization of production processes is of special importance for electrical communications, where creation of the "products of communications" (telegrams, telephone conversation, phototelegrams, etc) is the simultaneous activity of a large number of enterprises located in different parts of the country.

Communications facilities themselves contain many elements of automatic control. In the equipment of communications and broadcasting there occur complex electrical processes not requiring human intervention. The transmission of telegrams, phototelegrams, telephone conversations, radio broadcasts, and television broadcasts is achieved by means of equipment built on the principles of radio engineering, electronics, and automatic control.

Nevertheless, we have tens of thousands of workers engaged in attending existing communications facilities, and the models of new equipment and apparatus created by scientific research institutes and industry, once they are put in operation, require constant observation, regulation, and alignment, that is, they require a continuous shift of attending technical personnel. Even in such a more thoroughly automatized branch of communications as city telephone communications the total capacity of manual telephone exchanges is approximately 50% of the capacity of all telephone exchanges. Only in recent years was there begun the use of automatic control in intercity telephone networks, in intra-rayon telephone networks, at large telephone units, and little has been done in creating unattended radio stations and radio relay units.

Thus, the introduction of automatic control in communications is still proceeding at an inadequate tempo. The primary, ineluctable task in the coming years is the all-out effort for automatization of all electrical communications and broadcasting facilities. The successful solution of this task will permit a considerable reduction in operating personnel, an increase in the productivity of labor, acceleration of the process of establishing contact between subscribers, a decrease in the transit time of telegrams and phototelegrams and a simultaneous increase in the quality and reliability of communications.

Automatization may be partial or complex. As technico-economic calculations and practical experience show, maximum results may be achieved only by full, complex automatization, including the automatization and mechanization of auxiliary processes. For example, the introduction of partial automatization of the transceiving of telegrams

at the Minsk central telegraph office, begun several years ago on the initiative of Minsk inventors and innovators, has not yielded noticeable results and only a conversion to almost complete automatization has permitted a reduction in telegraph personnel by a hundred unnecessary persons.

The basic task in the field of telegraph communications lies in automatization of the transceiving of telegrams, so that at most telegraph centers the number of through telegrams will exceed 80 percent of the total traffic. Calculations show that with automatization of the transceiving of telegrams the productivity of labor is increased by approximately 1.5 times, the transit time of through communications at intermediate points is reduced by 3-4 times, and operational costs in the processing of telegrams are reduced 15-20 percent.

At present 30 large telegraph centers of the Soviet Union employ a simplified system of automatized transceiving of telegrams -- tearing off the perforated tape and conveying it to the site of subsequent transmission. However, the total number of telegrams processed by the automatized method is still small, amounting to approximately 15 percent of the total telegram traffic.

In order to achieve automatization of telegraph communications on a large scale it is necessary that the Ministry of Communications USSR rapidly complete the development and organization of series production of equipment for automatized transceiving of telegrams with code switching. At the same time it must ensure the production of telegraph roll units with automatic control instruments in the number needed for the enterprises of telegraph communications.

In addition to further introduction of automatized transceiving of telegraph messages with tearing off of perforated tape, wide use must be made of automatized electrical transit of telegrams along telegraph communications channels. Along with the installation of standard automatic subscriber exchanges, enterprises will be equipped with exchanges of low capacity designed for connection of 10, 30, or 50 subscriber telegraph circuits. Moreover, considerable attention must be devoted to problems of automatization and mechanization of such production processes as the intra-exchange processing of telegrams, maintenance of traffic records, making copies of telegrams, marking forms, binding file copies of telegrams, checking telegrams, and forwarding them.

Only the solution of these and a number of other technical problems will make it possible to cope with the principal task of converting from partial automatization of telegraph communications to its complete, complex automatization.

In connection with the planned extensive development of phototelegraphic communications the matter of automatization of the transceiving of phototelegrams is of special importance, for the phototelegraphic method of transceiving currently in use is complicated and requires a large operating staff. It is the duty of scientific research workers and designers to solve this problem without delay. It is time that a change was made from laboratory investigations and experiments in methods of recording phototelegrams on magnetic tape and solid magnetic storage devices to practical testing of these methods under operating conditions.

Until recently the interconnection of subscribers located in different cities as well as the technical servicing of intercity telephone exchanges and repeaters of open-wire and cable trunks have been performed for the most part manually. Suffice it to point out that the operating

and technical personnel of the repeater points of a cable trunk 1,000 kilometers long amounts to 200-250 persons.

Along with the creation of high-power long-distance communications channels there is need for extensive introduction of semiautomatic and automatic means of making connection with terminal and through telephone exchanges of the intercity networks. Experience shows that a changeover to the semiautomatic method alone would have extremely beneficial results: the manual work of telephone operators would be reduced by 35-40 percent, the utilization of communications channels would be increased by 5-10 percent, and the area required for production operations would be considerably reduced. This method may be used with success in the order and non-priority systems of operation, though particularly good results are obtained in on-priority communications operation.

In recent years work has begun in providing cable trunks with unattended repeater points which are remotely powered and controlled from basic repeaters. Work is also in progress for the creation of completely automatized cable trunks. Open-wire lines are being equipped with unattended auxiliary exchanges for 3-channel and 12-channel systems of high-frequency telephony, to be connected under severe meteorological conditions (frost, ice).

It is necessary, however, to point out that the mentioned measures for automatization of intercity telephone communications are being carried out by GUMTTS [Main Administration of Intercity Telephone and Telegraph Communications] of the Ministry of Communications USSR on an inadequate scale.

The most important problems in the automatization of intercity telephone communications are: extensive introduction of industrial equipment of semiautomatic control, development of a completely automatic system and the creation of high-power communications channels, completion of the development of a complex of units and apparatus for automatized cable trunks, creation of simplified designs of communications cables, stable compositing apparatus for open-wire telephone which is small and does not require constant attendance, and the development of equipment for intercity telephone communications to full automatization must be achieved.

There are a number of substantial shortcomings in the field of automatization of city telephone communications. The decade step-by-step telephone exchanges produced by industry do not fully meet modern technico-economic requirements. As the principal element in these exchanges there is employed a finder which wears out quickly and requires frequent adjustment. Due to the presence of mechanical contacts the noise voltage in the call circuit reaches an inadmissible level. The cost of the equipment is high and much productive space is required for installation of the exchanges.

The expansion of automatic city telephone communications urgently demands that a search be made for the most economical solutions in the field of GTS [city telephone communications] line construction. Work is now in progress for the introduction of equipment for two-wire junction lines, for the creation of unattended automatic telephone subexchanges, etc. Also of extreme importance is economical high-frequency apparatus for compositing of short-run cables, which apparatus is now in the final stages of development. An experiment conducted at the Moscow City Telephone Network has demonstrated the possibilities for organization of local telephone communications on ultrashort waves.

In order to create a single complex of automatized telephone communications it is necessary to improve the existing apparatus and to continue the development of new apparatus for automatization of city telephone networks in complete coordination with the work in progress for automatization of suburban, intercity, intraoblast, and intrarayon communications. Automatization of city telephone communications must be achieved not merely by modernization of ATS's [automatic telephone exchanges] of the decade step-by-step system but also by the creation of new ATS systems with the application of the latest achievements of electronics. It is well known that a number of foreign countries have created and are developing advanced ATS systems -- employing an electronic method of control in the US, electronic in England, mechanical and electronic in Belgium, with a motor-driven finder in Germany, with a coordinate finder in Sweden, et al.

Much work must also be done in creating economical, compact, unattended automatic telephone exchanges of low capacity, with block construction, powered by dry batteries and employing new types of relays and finders. Without solution of this problem completion of the vast plan for installation of telephone facilities in villages is inconceivable.

The workers of the scientific research institutes, design bureaus, and plants of the Ministry of Radio Engineering Industry USSR and the Ministry of Communications USSR together with operations workers must make no little effort for expeditious, high-quality fulfilment of the abovementioned basic tasks in the field of wire communications.

In recent years in the Soviet Union radio communications, radio broadcasting, radiofication, and television have undergone considerable expansion and much new radio equipment and apparatus has been introduced. However, in these branches only partial automatization is being carried out and little has been done for the creation of fully automatized equipment. For example, at a number of radio transmitters the tuning and alignment of individual stages is performed automatically, in radio-relay equipment provision is made for automatic switching to a standby set, and in radio-relay networks use is made of a system of high-frequency transmission of radio programs from the rayon center along steel-wire circuits wherein the receiving equipment installed at the other end is remotely fed and automatically controlled from the rayon center.

The basic task in the field of improvement of radio communications facilities is the development of unattended radio stations, principally of unattended ultrashort-wave transmitters, of intermediate radio-relay points and television transmitters. Automatic control of transmitters and receivers (including remote connection and disconnection), automatic switching from one wavelength to another, automatic maintenance of operating conditions of transmitting and receiving installations by means of automatic systems of alignment, as well as wide use of air-cooled tubes -- all this will permit a considerable reduction in attending personnel at radio transmitting and receiving stations.

No less important are the tasks in the field of radiofication. Complex automatization of installations for wire radiofication must follow two courses. The first of these is telemechanization of the operational control of rural wire broadcasting units and of isolated receiving points so that the attendance of nets of such units and points may be achieved from the rayon control center. The second of these courses is improvement of the system of remote control of the equipment of city wire broadcasting units, which now require a large number of conductors and do not insure reliable operation and constant control.

It is impossible to achieve the transition from partial automatisation to complex automatization without solving the problems of automatization of power-supply installations and of Diesel generation, without improving power-supply systems, and, finally, without automatizing the electrical measurement and control of communications and broadcasting channels, introducing visual methods of inspection and visual methods of determining fault locations in open-wire and cable communications lines and in equipment.

Thus, the basic direction of technical progress in all branches of communications and broadcasting is the transition from partial automatization. The creation of automatized units, unattended apparatus and equipment, automatized cable and radio-relay systems, unattended radio stations and wire broadcast units of different power and purpose, and the remote control of the latter installations constitute the path for development of communications engineering in the immediate future.

Solution of the abovementioned tasks calls for great creative effort on the part of scientific workers, designers, technologists, and operational and industrial workers. New scientific research must be conducted and the optimal, most economic solutions must be adopted. Moreover, it is necessary to devote special attention to the creation of a material-technical base for the realization of complex automatization -- the development of new, modern elements of automatic control: compact relay units with low inertia and minimum power requirements, electronic relays and switches, various semiconductor devices, miniature vacuum tubes with long use life. These problems can only be solved through the creative cooperation of scientific workers and production workers with the active assistance of inventors, rationalizers, and innovators.

Extensive introduction of automatization in all branches of communications is a most important and ineluctable task whose successful solution will insure further technical progress in the field of communications in our socialist Motherland.

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